A SWITCH PROVIDED WITH A SIGNALLING COUPLER, AND A METHOD OF SENDING A SIGNALLING MESSAGE

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The present invention relates to a switch provided with a signalling coupler. The invention also provides a method of sending signalling messages. It is used mainly in the field of telecommunications for the purpose of transmitting signalling signals that are used in particular in controlling telephone exchanges, i.e. private or public switches. The object of the invention is to make the transmission of signalling signals more transparent in spite of the variety of transmission techniques and protocols adopted.

BACKGROUND OF THE INVENTION

In communications networks interconnecting a plurality of exchanges (private or public), calls are distributed amongst channels. Thus, in more or less general terms, so-called "B" channels are known which are general-purpose channels for conveying messages between various parties. The parties may be people in which case the messages can be voice messages. The parties can also be machines, in which case the messages will be digitized data messages. In practice, analog transmission for messages between people is being abandoned in favor of digital transmission, since transmission quality is better.

Besides such general-purpose channels, there are so-called "D" channels which serve to carry signalling data. In operation exchanges, or switches, need to send each other messages concerning their availability and their mode of operation. For example, if a telephone exchange is connected to a base station of a time division multiple access (TDMA) type mobile telephone network, it is necessary to transmit synchronization, and to transmit the time to the various mobile stations which seek to come into contact with the base station. In another example, in the X25 protocol, before a message can be sent, it is necessary to deliver information to the

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circuits that are in the traffic concerning the time position and the encapsulation data that is to be placed around the message.

To simplify explanation, it is recalled that in a digitized communications system in France there exist so-called "T2" services which thus comprise for the user thirty "B" channels for conveying speech, and one "D" channel for conveying signalling messages.

The problem of managing signalling messages is essentially associated with the protocol which organizes a link between two telephone exchanges. For any one such link, the protocol is known by the two exchanges involved, and signalling messages can normally be conveyed between them. If a signalling message needs to be forwarded to another exchange using a link that has the same protocol for transmitting signalling messages, then the signalling message can be forwarded as such. It will be correctly interpreted by the end exchange.

However, a problem arises within a network that is not uniform, in that it contains a variety of communications channels. Under such circumstances, either the signalling message cannot be conveyed or, in order to enable it to be conveyed, an exchange in the network at which links using different protocols terminate must include as many transcoders for forwarding signalling messages as there are pairs of different transmission protocols for such signalling messages. Given the present wide variety of signalling channels, and given the wide variety of protocols that can be used within these channels, such signalling message transcoding is not undertaken. The whole advantage of signalling channels is lost once the network is not uniform.

OBJECTS AND SUMMARY OF THE INVENTION

An object of the invention is to remedy this problem by proposing a generic solution which can be adapted without difficulty to any possible variety of

transmission protocols for signalling signals. In the invention the modification to the equipment is always the same, thereby reducing the cost of such equipment which can be mass-produced. The principle of the invention is based on two main means. Firstly, the sending of a signalling message is given the syntax of a predetermined order (instruction). The predetermined order is always the same, whatever the resources available in a telephone exchange for conveying a signalling message. Secondly, physically, each exchange, each switch, has an interpreter for producing a signalling configuration that corresponds to the signalling message transmission resources accessible from the communications exchange, and the interpreter is set into operation in response to receiving said predetermined order.

In the invention, proposals are also made to use, for said predetermined order, a syntax that is specific to a known transmission channel. This most widespread known transmission channel for signalling signals is the channel used in the state of the art for channels of the T2 type mentioned above. Under such conditions, each telephone exchange is capable of transmitting the signalling message using its own protocols without having to develop special equipment.

The present invention thus provides a switch provided with a signalling coupler, the switch including an interpreter to produce a signalling configuration on receiving a predetermined character string corresponding to an order to send a signalling message, the signalling configuration depending on the signalling resources accessible to the coupler.

The invention also provides a method of sending a signalling message by a telephone exchange, the method comprising the following steps:

· a predetermined character string corresponding to a predetermined send order for said signalling message is added to said signalling message; and

· said send order is interpreted in an interpreter of a switch to produce a signalling configuration of said switch, the signalling configuration depending on the signalling resources available to the switch.

BREIF DESCRIPTION OF THE DRAWINGS

The invention will be better understood on reading the following description and on examining the accompanying figures. The figures are given by way of non-limiting indication of the invention. In the figures:

· Figure 1 shows a signalling coupler of the invention usable in a switch; and

· Figure 2 shows the essential steps in the method of the invention.

MORE DETAILED DESCRIPTION

Figure 1 shows a signalling coupler 1 of the invention. The coupler 1 is designed to be placed in a telephone exchange having channels for carrying signalling data between a network inlet and a network outlet. In conventional manner, the coupler 1 has a physical interface 2 with general-purpose data transmission channels B. The interface 2 can thus be connected to a digital B channel output 3 or to an analog B channel output 4. The coupler 1 also has a physical interface 5 for transmitting signalling signals. This physical interface, the subject matter of the invention, can thus have various circuits 6 to 13 relating to interfacing different protocols. In non-exhaustive manner, these can comprise, IP protocols usable for an Ethernet network, the frame relay protocol for a network of the same type, the ATM protocol, the switched X25 protocol, a generic modem protocol (including all possible varieties of compression modes and bit rate), a QSIG protocol, and a switched B channel protocol. It may also relate to an interface of conventional type in the T0 or T2 format. The three last-mentioned protocols apply to digital networks.

According to the invention, the interface 5 for transmitting signalling messages is separated from members 15 or 16 that generate such messages by means of an interpreter module 14. As explained below, the interpreter module 14 is capable of running the program of Figure 2 to transform a signalling message as delivered by a member 15 or 16 into a message that is easily transmissible in a communications network 17 possibly possessing transmission protocol converters at interposed nodes 18 prior to the signalling message reaching an exchange 19 to which it is addressed. In practice, the members 15 or 16, insofar as they are intended essentially to organize calls between exchange 1 and exchange 18 or exchange 19, are normally peripherals of exchange 1. Nevertheless, there is nothing to prevent these members 15 and 16 being external and even for the signalling messages they deliver coming from a signalling link.

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In the state of the art, as mentioned above, a member 15 seeking to send a signalling message needed itself to be connected directly to one of the interfaces 6 to 13. The specific message then needed to be processed in the interface 6 to 13 so as to put it into a form (known in advance) suitable for enabling it to be incorporated in the traffic of the network 17.

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In the invention, an access 20 to the interface 14 is specific to a signalling channel: all messages reaching the access 20 coming from a member 15 or 16 must be considered as being signalling messages by the very fact that they arrive on a signalling channel. They are dealt with accordingly.

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In the invention, the interpreter 14 thus needs to select the signalling configuration of the coupler 1 so as to enable it to adapt, preferably in real time and without extra cost, to transmitting the signalling messages it receives via its access 20 (using a protocol specific thereto), while in the member 15 or in the

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member 16 it is not known how the signalling channel is implemented. The access 20 can be a distinct physical access or a particular way of addressing a communications bus.

Figure 2 thus shows a step 21 in which a signalling message "SIGNALLING" is composed by an operator in a member 15. In other words, the signalling message is produced by the member 15 and it is sent to the interpreter 14. In the interpreter 14, the message "SIGNALLING" produced by the member 15 receives a predetermined additional character string in an operation 22, which string is always the same. This character string represents a send order. For example, the predetermined send string can correspond to the instruction "SEND T2" that is used in particular in the above-mentioned T2 type protocol to send a signalling message. It should be observed that this predetermined send order "SEND T2" is added to the message "SIGNALLING" whatever the protocol that is to be used thereafter for conveying it to the exchange 19. This builds up a phrase: "SEND T2, SIGNALLING". The character string "SEND T2" is located, for example, at the beginning of the phrase that is built up.

During an operation 23, the interpreter 14 then responds to the received phrase by interpreting the character string "SEND T2" (at the beginning thereof) representing the predetermined send order. In so doing, this interpretation consists in adapting the encapsulation of the message "SIGNALLING" (i.e. without "SEND T2") to a signalling message transmission protocol available in the interface 5, and in putting into operation the corresponding interface 6 to 13. For example, if only one of the interfaces is available, e.g. the switched X25 interface 9, then the interpretation of the predetermined send order will consist in configuring the signalling of the coupler 1 so that the signalling message "SIGNALLING" that it has just received is

conveyed over a link 91 connected to the interface 9. In conventional manner, this configuration will include appropriate switching in the interface circuits 9, and possibly also modification of the message "SIGNALLING" in order to encapsulate it.

If the interface 5 has a variety of signalling link options open to it, provision can be made for it to select the option concerning the link which makes it possible to reach exchange 18, or even if a plurality of links are available, to select the link which is available first chronologically, in a hierarchical order.

Then during a step 24, the signalling message is indeed sent.

On reception, the signalling message "SIGNALLING" is applied to an input of another coupler 1 likewise installed, in accordance with the invention, in the exchange 18. In the coupler 1 in this other exchange 18, the signalling message "SIGNALLING" is again interpreted in an interpreter 14 during a step 25. The coupler 1 of its other exchange 18 thus preferably has a second access for signalling messages coming from an upstream exchange, and that might need to be forwarded. The messages admitted to this second access are then subjected to processing that is different from that applied to messages coming from message-producing members 15 or 16 that are admitted on the access 20.

During the step 25, the message "SIGNALLING" that has been conveyed thereto is thus given a receive flag. In practice, it is preferable to adopt a character string corresponding to a known type of flag, entitled "RECEIVE T2", and usable in the T2 protocol. During a test 26 after the flag has been added, the exchange 18 that receives the message looks in the content of this message "RECEIVE T2, SIGNALLING" to see whether the destination has been reached. If the destination has been reached, the signalling message is subjected to processing 27 in the same manner as in the state of the art.

However, if exchange 18 is not the destination, then the interpreter 14 in this other exchange 18 causes the receive flag "RECEIVE T2" to be replaced, in a step 28, by the predetermined character string "SEND T2" corresponding to the send order. The interpreter 14 in this other exchange then, in its turn, runs step 23 so that the message is sent on from this other exchange 18, using a protocol for conveying signalling messages that is available in this other exchange. The message is thus forwarded in this way until it ends up by reaching the destination exchange 19 where it is processed for execution purposes.

It can thus be seen that by operating in this way the message "SIGNALLING" is transmitted transparently through the various physical interfaces 2 to 13 of the signalling channels between exchanges, and that transmission of the message no longer depends on the specific physical means actually available in the interfaces 5. By adopting such a configuration, differences between various networks cease to be relevant. In practice, an interpreter 14 comprises a microprocessor associated with the program. Alternatively it can be a working session in a processor running a switch. As a result the interpreter 14 does not require any additional circuitry, only some additional programming. The processor, or the dedicated microprocessor, then performs the required processing and switching in application of the program.